

AMENDMENT

Serial Number: 10/811,485

Filing Date: March 26, 2004

Title: Method And Apparatus For Forming A Nitride Layer On A Biomedical Device

Page 7
SWRI:003**REMARKS**

The Official Action mailed November 9, 2006 has been carefully considered. Claims 1-26 are pending in the application. Claims 1-20 stand rejected and claims 21-26 have been withdrawn from consideration. Reconsideration and allowance of the subject application, as amended, are respectfully requested.

Amendments to the Specification

The specification has been amended to clarify the government support clause and to recite: “[t]his invention was made with government support under DAMD17-97-2-7016 awarded by the National Medical Technology Testbed sponsored by the Department of the Army. The government has certain rights in the invention.” No new matter has been entered by this amendment.

Amendments to the Claims and Rejections under 35 USC §112

Claims 8 and 9 stand rejected under 35 USC §112, first paragraph, as failing to comply with the enablement requirement.

Claim 8 has been amended to recite “wherein nitrogen and another gas are introduced into the vacuum chamber.” Support for this amendment, may be found in paragraph [0015] of the published application, which recites in part: “[i]t should be appreciated that the source of nitrogen can be pure nitrogen or can be a mixture of nitrogen with another gas.” No new matter has been added by this amendment. Accordingly, it is respectfully submitted that the rejection of claim 8 under 35 USC § 112 has been overcome.

Claim 9 recites “wherein the nitride layer has a thickness of about 1 to about 4 microns.” Support for this amendment, may be found in paragraph [0009] of the published application which recites in part that “[i]n another broad respect, this invention is a biomedical device made of a metal alloy which comprises an outer nitride layer having a thickness of at least 1 micron on a biomedical device.” Further support for the language of claim 9 may be found in paragraph [0022] of the published application which recites “the nitrided layer (a few μm) is much deeper

AMENDMENT

Serial Number: 10/811,485

Filing Date: March 26, 2004

Title: Method And Apparatus For Forming A Nitride Layer On A Biomedical Device

Page 8
SWRI:003

than that formed by ion implantation.” In addition, support for claim 9 may be found in paragraph [0023] which recites that “[u]sing the apparatus and process of this invention, a deep nitrided layer of about 3-4 microns was observed on the sample treated in accordance with the invention.”

Accordingly, as can be seen from the above recitations from the specification, the specification clearly discloses that a nitrided layer may be formed that is at least 1 micron in thickness and that layers 3-4 microns may be formed. Accordingly, the nitride layer may have a thickness of about 1 to 4 microns as disclosed in the specification. It is therefore believed that the above discussion clarifies the support for claim 9 and renders the rejection of claim 9 moot.

Claim 1-20 stand rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention.

Claim 1 has been amended to recite “the at least one biomedical device” instead of “the at least one prosthetic device.” No new matter has been entered by this amendment. In addition, it is respectfully submitted that this amendment overcomes the outstanding rejection of claim 1 under 35 USC § 112.

Claim 17 has been cancelled. Accordingly, Applicants respectfully submit that this amendment renders moot the rejection of claim 7 as being identical to claim 17.

In addition, and further discussed below, claim 1 has been amended to recite “providing a vacuum chamber having a wall with at least one biomedical device positioned thereon on a worktable within the vacuum chamber; reducing the pressure in the vacuum chamber; introducing nitrogen into the vacuum chamber so that the pressure in the vacuum chamber is about 0.01 to about 10 milli-Torr; generating electrons from a device comprising an electron source within the vacuum chamber to form positively charged nitrogen ions; providing a voltage between said electron source and the vacuum chamber wall, said voltage configured to draw electrons toward same chamber wall.” Support for this amendment may be found in paragraph [0018] of the published application which recites in part: “[d]uring use, a voltage may be applied between the electron source 28 and the vacuum chamber 20, which causes electrons to be drawn to the walls of the chamber.” No new matter has been entered by this amendment.

AMENDMENT

Serial Number: 10/811,485

Filing Date: March 26, 2004

Title: Method And Apparatus For Forming A Nitride Layer On A Biomedical Device

Page 9
SWRI:003

Furthermore, new claim 27 has been added which recites: “wherein said voltage between said electron source and the vacuum chamber is in the range of 30 to 150 volts.” Support for this amendment may be found in paragraph [0018] of the published application which recites in part:

“For example, in one embodiment, a DC voltage, such as in the range of 30-150 volts, may be applied between the electron source and the chamber, thereby drawing electrons to the chamber wall.”

No new matter has been added by this amendment.

Rejections under 35 USC §103(a)

Claims 1-2, 4-8, 11-13 and 17-20 stand rejected under 35 USC §103(a) as being unpatentable over Melitis, U.S. 5,336,264. In addition, claims 1-6 and 9-16 stand rejected under 35 USC §103(a) as being unpatentable over Bordji, et al, Biomaterials, 17, pp 929-940, 1996.

As an initial matter, and as noted above, Applicants have amended claim 1 to reflect generating electrons from a device comprising an electron source within the vacuum chamber to form positively charged nitrogen ions and providing a voltage between said electron source and the vacuum chamber wall, said voltage configured to draw electrons toward said chamber wall. Applicants respectfully assert that it would appear that Melitis fails to teach or suggest such claimed subject matter. More specifically, Melitis discloses that its device, as illustrated in **FIG. 1**, utilizes a thermionic electron emission source in combination with a positive plate within the chamber. Col. 5, lines 27-32. Melitis goes on to emphasize the importance of such a combination at col. 2, line 67 through column 3, line 4, which recites as follows:

“Intensification of the glow discharge is accomplished by combining a thermoionic source with a triode glow discharge source which may comprise a positively charged electrode, an RF source, a magnetic field or other sources sometimes use in conventional nitriding systems. By intensification, we denote an increasing number of electrons or ions having a higher energetic flux density.”

Accordingly, Melitis, as understood, emphasizes that one must utilize a thermionic electron emission source in combination with a positive plate. Furthermore, Melitis also emphasizes the use of a “glass bell” (see FIG. 1) as opposed to the recited vacuum chamber wall and the feature

AMENDMENT

Serial Number: 10/811,485

Filing Date: March 26, 2004

Title: Method And Apparatus For Forming A Nitride Layer On A Biomedical Device

Page 10
SWRI:003

that a voltage exists between the wall and chamber such that electrons may be drawn toward the chamber wall. Melitis, using a “glass bell” would appear to teach away from this feature.

In addition, it is believed that Bordji fails to make up for the deficiencies of Melitis, as Bordji similarly does not teach or suggest generating electrons from a device comprising an electron source within the vacuum chamber to form positively charged nitrogen ions and providing a voltage between said electron source and the vacuum chamber wall, where said voltage is configured to draw electrons toward the chamber wall. Accordingly, Applicants respectfully submit that the claimed subject matter now defines over the cited references.

Having dealt with all the rejections raised by the Examiner, it is respectfully submitted that the present application, as amended, is in condition for allowance. Thus, early allowance is earnestly solicited.

If the Examiner desires personal contact for further disposition of this case, the Examiner is invited to call the undersigned Attorney at 603.668.6560.

No claim fee is believed necessary as a result of this response as the number of independent claims (3) and total numbers of claims (26) do not exceed the number of independent claims and total claims paid at the time of filing the application.

In the event there are any fee deficiencies or additional fees are payable, please charge them (or credit any overpayment) to our Deposit Account 50-2121.

Respectfully submitted,

By: /Steven J. Grossman, Ph.D./
Steven J. Grossman, Ph.D.
Reg. No. 35,001
Grossman, Tucker, Perreault & Pfleger, PLLC
55 South Commercial Street
Manchester, NH 03101
603-668-6560